

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Exam: Function Reflections (Solution version 607)**

1. (worth 9 points) Let function  $f$  be defined by the polynomial below:

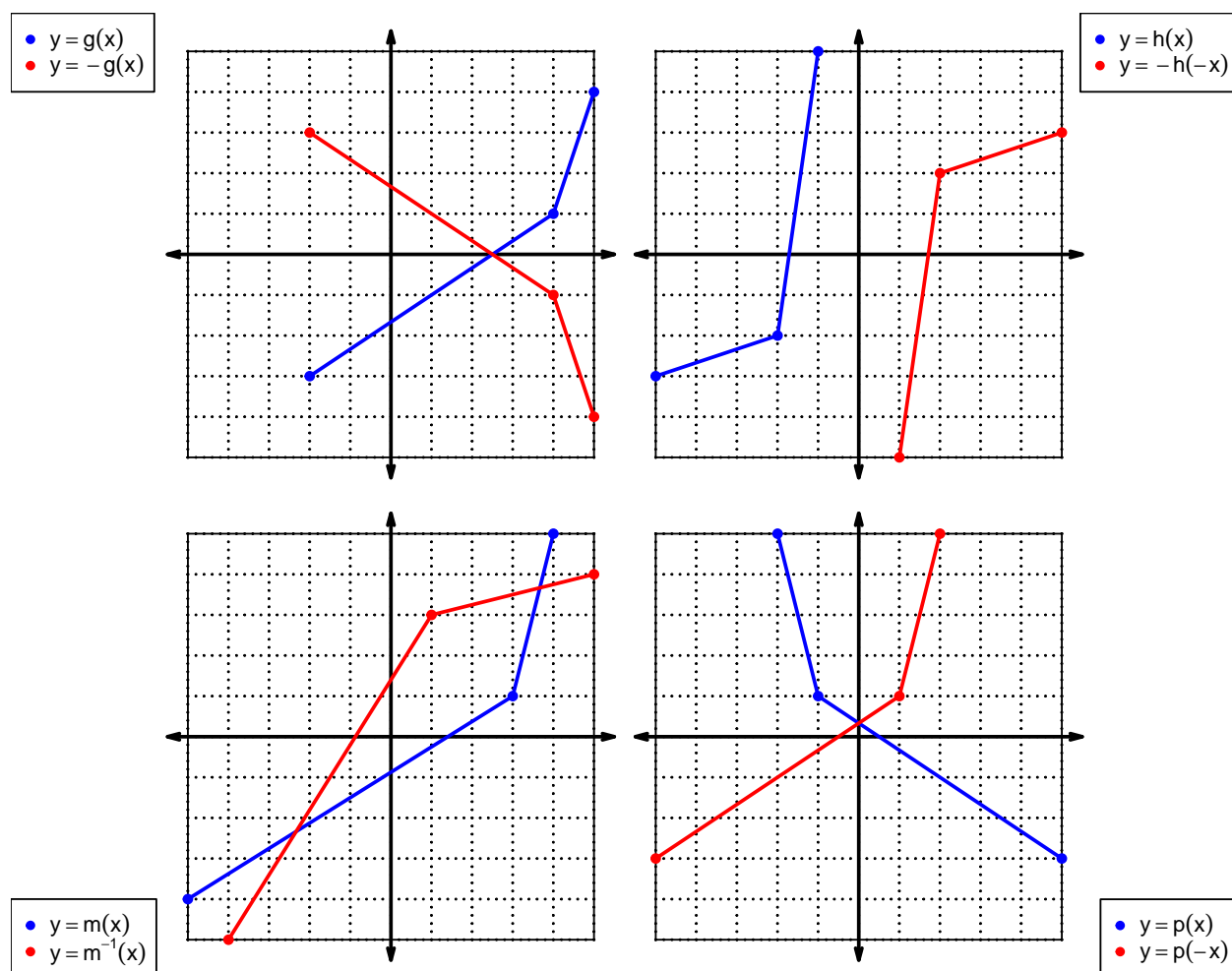
$$f(x) = 5x^4 - 9x^3 - 3x^2 - 6x + 4$$

Draw lines that match each function reflection with its polynomial:

**Reflections****Polynomials**

$-f(x)$	●	●	$5x^4 + 9x^3 - 3x^2 + 6x + 4$
$f(-x)$	●	●	$-5x^4 + 9x^3 + 3x^2 + 6x - 4$
$-f(-x)$	●	●	$-5x^4 - 9x^3 + 3x^2 - 6x - 4$

2. (worth 20 points) In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	6	3	4
2	5	6	3
3	7	9	5
4	3	5	8
5	9	2	6
6	8	4	7
7	2	7	1
8	1	1	2
9	4	8	9

3. (worth 3 points) Evaluate  $f(3)$ .

$$f(3) = 7$$

4. (worth 3 points) Evaluate  $h^{-1}(8)$ .

$$h^{-1}(8) = 4$$

5. (worth 3 points) Assuming  $g$  is an **even** function, evaluate  $g(-9)$ .

If function  $g$  is even, then

$$g(-9) = 8$$

6. (worth 3 points) Assuming  $f$  is an **odd** function, evaluate  $f(-6)$ .

If function  $f$  is odd, then

$$f(-6) = -8$$

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7. (worth 15 points) A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = -x^3 + 1$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = -(-x)^3 + 1$$

$$p(-x) = x^3 + 1$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(x^3 + 1)$$

$$-p(-x) = -x^3 - 1$$

- c. Is polynomial  $p$  even, odd, or neither?

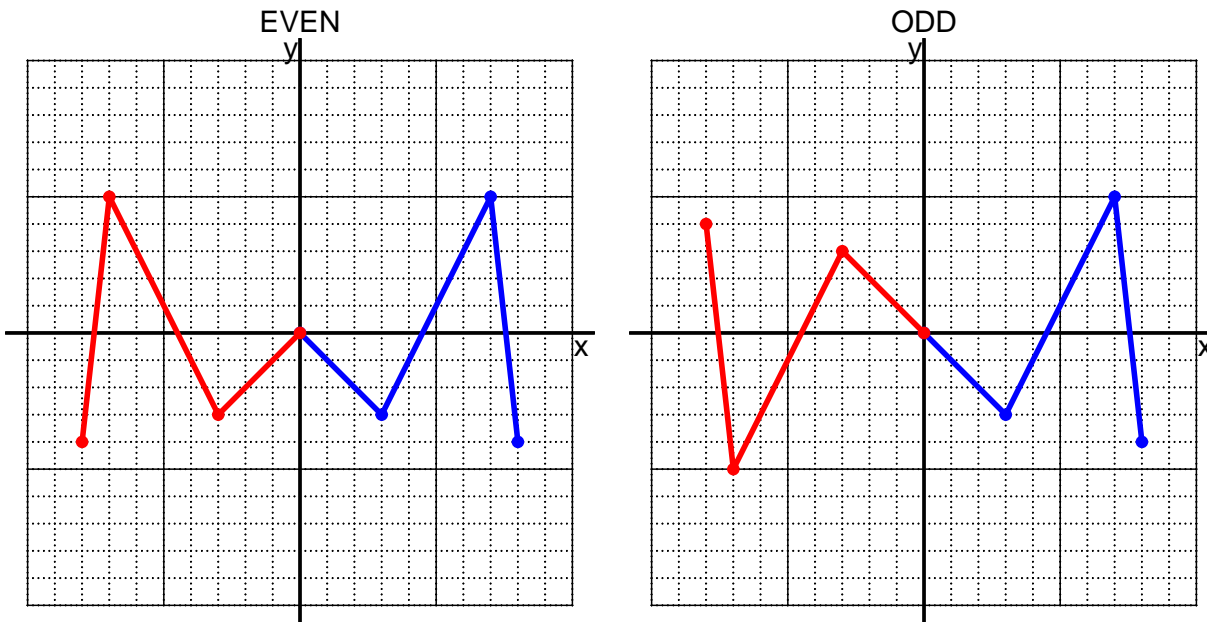
neither

- d. Explain how you know the answer to part c.

We see that  $p(x)$  is not equivalent to either  $p(-x)$  or  $-p(-x)$ , so  $p$  is neither even nor odd.

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8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function  $f$  be defined with the equation below.

$$f(x) = 2(x - 8)$$

- a. Evaluate  $f(53)$ .

step 1: subtract 8  
step 2: multiply by 2

$$\begin{aligned} f(53) &= 2((53) - 8) \\ f(53) &= 90 \end{aligned}$$

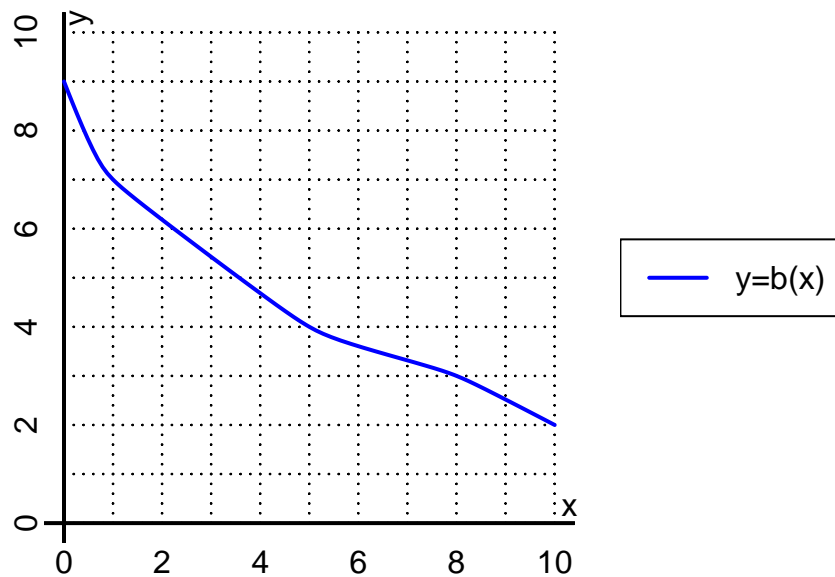
- b. Evaluate  $f^{-1}(98)$ .

step 1: divide by 2  
step 2: add 8

$$\begin{aligned} f^{-1}(x) &= \frac{x}{2} + 8 \\ f^{-1}(98) &= \frac{(98)}{2} + 8 \\ f^{-1}(98) &= 57 \end{aligned}$$

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10. (worth 6 points) The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(8)$ .

$$b(8) = 3$$

b. Evaluate  $b^{-1}(4)$ .

$$b^{-1}(4) = 6$$

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11. (worth 18 points) Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-9	9	9	-9
-1	8	-8	-8	8
0	0	0	0	0
1	-8	8	8	-8
2	9	-9	-9	9

b. Is function  $f$  even, odd, or neither?

odd

c. How do you know the answer to part b?

Function  $f$  is odd because column  $-f(-x)$  matches column  $f(x)$  exactly.